International Journal of Computer Informatics & Technological Engineering
VOLUME -1, ISSUE -1, MARCH- APRIL, 2014
PAPER ID: 2014/M-A/IJCITE/V1-E1-01

CONVERSION OF VOICE SIGNAL INTO CHARACTERS USING ARITHMETIC CODING

Krishna Dharavathu[1], Raja Gorumuchu [2], Hemalatha Tankala [3]
[1]Assistant Professor, Department of Electronics and Communication Engineering
Lingayas Institute of Management and Technology,
Vivek Nagar, Madalavarigudem, Vijayawada
[2, 3] Scholars, Department of Electronics and Communication Engineering
Lingayas Institute of Management and Technology,
Vivek Nagar, Madalavarigudem, Vijayawada

Abstract: **This paper enables a method of conversion of voice signal through mobile communication using Arithmetic coding. In olden days mobile communication supports only voice communication and only text transmission. But this method is enable combine of this two technologies for better communication. For this purpose we are using pulse code modulation and arithmetic coding technique. By using this method we get a better communication results.**

Keywords: **SMS (Short Message Service), GSM (Global System for Mobile Communications), PCM (Pulse-Code Modulation) Audio messages, Arithmetic coding compression technique.**

I. INTRODUCTION

Now days the SMS service is very popular to the communication because it has more advantages compared to the voice signal transmission. And this SMS technology is support national and international roaming. SMS size is limited to 160 characters and it can only send alphanumeric text only. But now days this service support animations, images, and long texts called EMS (Extended Messaging Service). Presented method has three major steps; first step is about converting user input into characters and second step performs compression method on those characters and third step converts the compressed characters into strings and set that strings into payloads. For compression, Arithmetic Coding method is used. Main reasons for selecting Arithmetic Coding is very efficient for more frequently occurring sequences of pixels with fewer bits and reduces the file size dramatically.

This paper enable the method of sending PCM based audio messages through SMS. As SMS is text based service, so a method is developed which converts audio messages into characters. After converting lossless compression technique; Arithmetic coding is applied. Lastly those characters will set as a payload text of SMS. Paper is divided into following sections. Section 2 discusses the related work, section 3 and 4 is about proposed methodology and results and lastly we conclude the paper.

II. RELATED WORK

A technique which permits wireless operator to attain information from World Wide Web, internet or other information basis via SMS or micro browser in phone. Method uses a dialled telephone number, feature code, other dialled digits or SMS origination message to cause SMS and micro browser messages to be sent to a wireless telephone or other device. For converting the voice signal to text format, the input voice signal which is a continuous signal is applied to the PCM (Pulse Code Modulation) and the output of PCM which is in binary format is compressed by using Arithmetic coding. The procedure of converting voice signal to binary data is represented by the block diagram given below:

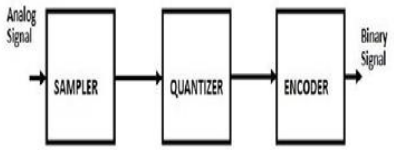

Figure 2.1: Converting voice signal to binary data

III. PROPOSED METHODOLOGY

For transferring and retrieving of PCM based audio messages through SMS, install our application on a mobile phone. It takes voice messages as input from user and converts that input into a SMS; hides variant steps from the user. The variant steps are;

I. First, it stored user input in Byte Array Output Stream.

International Journal of Computer Informatics & Technological Engineering
VOLUME -1, ISSUE -1, MARCH- APRIL, 2014
PAPER ID: 2014/M-A/IJCITE/V1-E1-01

II. First, it stored user input in Byte Array Output Stream.

III. Second, it converted the signed Byte Array Output Stream into unsigned integer array.

I. In third step we convert the unsigned integer array into ASCII characters. But before that conversion, 256 was added in all unsigned integer array values which was ranged between 0-31 in ordered to move them up to the range of 256- 287. The main reason behind this was that, values of 0-31 of ASCII characters cannot send through SMS. Because such characters were universally reserved for specific functions ; „0_ represents null in ASCII etc.,

II. Fourth, apply lossless compression algorithm Arithmetic coding on Extended ASCII characters. Arithmetic coding algorithm focuses on the frequency of the characters; and generally frequency represents in a tree format.

III. Fifth, now convert ASCII characters into strings and again convert into payloads.

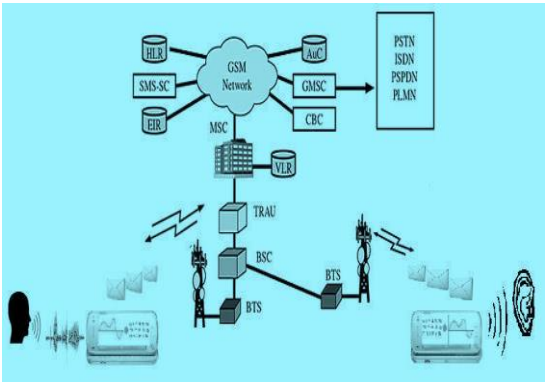

Figure 3.1: Existing Architecture and Proposed System interaction

Characters generated by the application could not be adjusted in one SMS; it may consume multiple numbers of SMS. Here, we used the extended SMS called Concatenated SMS. Indexing used for linking each SMS. At the receiver side we implement the same application. When the receiver receives the message our application convert that message into voice signal. Figure 3.1 describes the proposed system interaction within the existing GSM architecture. Our system does not require any hardware or intermediate source while transferring the voice. It is just an application which installed in a mobile phones.

IV. RESULTS AND DISSCUSSION

For real time results we developed an application using J2ME platform and installed it on "Nokia N95" for testing. During experiments our major focus on two factors; number of characters and number of concatenated SMS. In graphs; x axis represents test numbers. Here, we considered two cases; with Arithmetic Compression and without With Arithmetic Compression. "PCMW" Represents "With Arithmetic Compression" and "PCM" Represents "Without Compression".

Table 1: Basic characteristics of voice messages

Sentence 1	This is an Audio Clip		
Sentence 2	The five boxing wizards jump quickly		
Sentence 3	By Jove, my quick study of lexicography won a prize		
Sentence	**Sentence 1**	**Sentence 2**	**Sentence 3**
Test Numbers.	1 to 10	11 to 20	21 to 30
Length (letters)	17	31	41
Length (Words)	5	6	10

For experiments we used different voice sentences with different time durations; three sentences are shown in table 1. The results of experiments are shown in figure 1 a, b. we consider two cases; with and without compression. Case one is without compression and its result is shown in blue line. Where case two describes the compression technique within the application and its result is in red line.

Figure 4.1 shows the compression of two cases; with or without compression. And graph is evident that Huffman Coding perform very well with the method. Similarly figure 4.2 represents the compression of both cases in form of connected SMS.

Figure 4.1: Number of characters

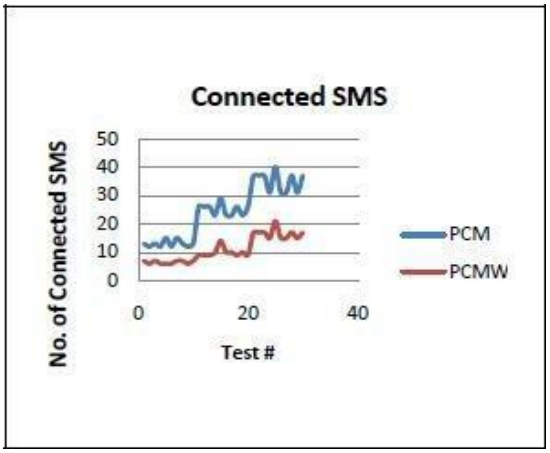

Figure 4.2: Number of connected SMS

V. CONCLUSION

SMS supports only alphanumeric service but it do not support voice transmission service. In this paper we enable the combination of these two technologies & improve communication service. Using this application all GSM devices can send or receive PCM based voice messages. This method is very simple and did not need any changes in existing infrastructure of GSM-SMS. In this paper we also verify the efficiency of Arithmetic coding range and arithmetic coding. It has also code samples for 3 different arithmetic encoders along with performance comparison.

VI. REFERENCES

[1] http://e-articles.info/e/a/title/The-Main-Protocols-used-by- Mobile-Phones-(SM S-EMS-MMS-WAP)/

[2] M. R. Nelson, "Arithmetic coding and statistical modelling," Dr. Dobb_s Journal.

[3] Sunit Lohtia, Wilfred Martin James, Boon Chong Hwang, "System and Method for subscriber initiated information over the SMS or Micro Browser",United States Patent Application, Pu blication Number 6560456B1, May 2003. Online available: http://www.google.com.pk/patents?hl=en&lr=&vid=USPAT6560456&id=8QMPAAAAEBAJ&oi=fnd&dq=voice+over+SMS&printsec=abstract#v=onepage&q=voice%20over %20SMS&f=false

[4] Chwan-Lu Tseng et al, "Feasibility study on application of GSM–SMS echnology to field data acquisition", Computers and Electronics in Agriculture, Volume 53, Issue 1, Pages 45-59, August 2006.

[5] . Fahad Khan and Saira B eg, "Transferring Voice using SMS over GSM Network", Journal of Computing (JoC), pp 50-53, Volume 3, Issue 4, April 2011. ISSN-2151-9617.